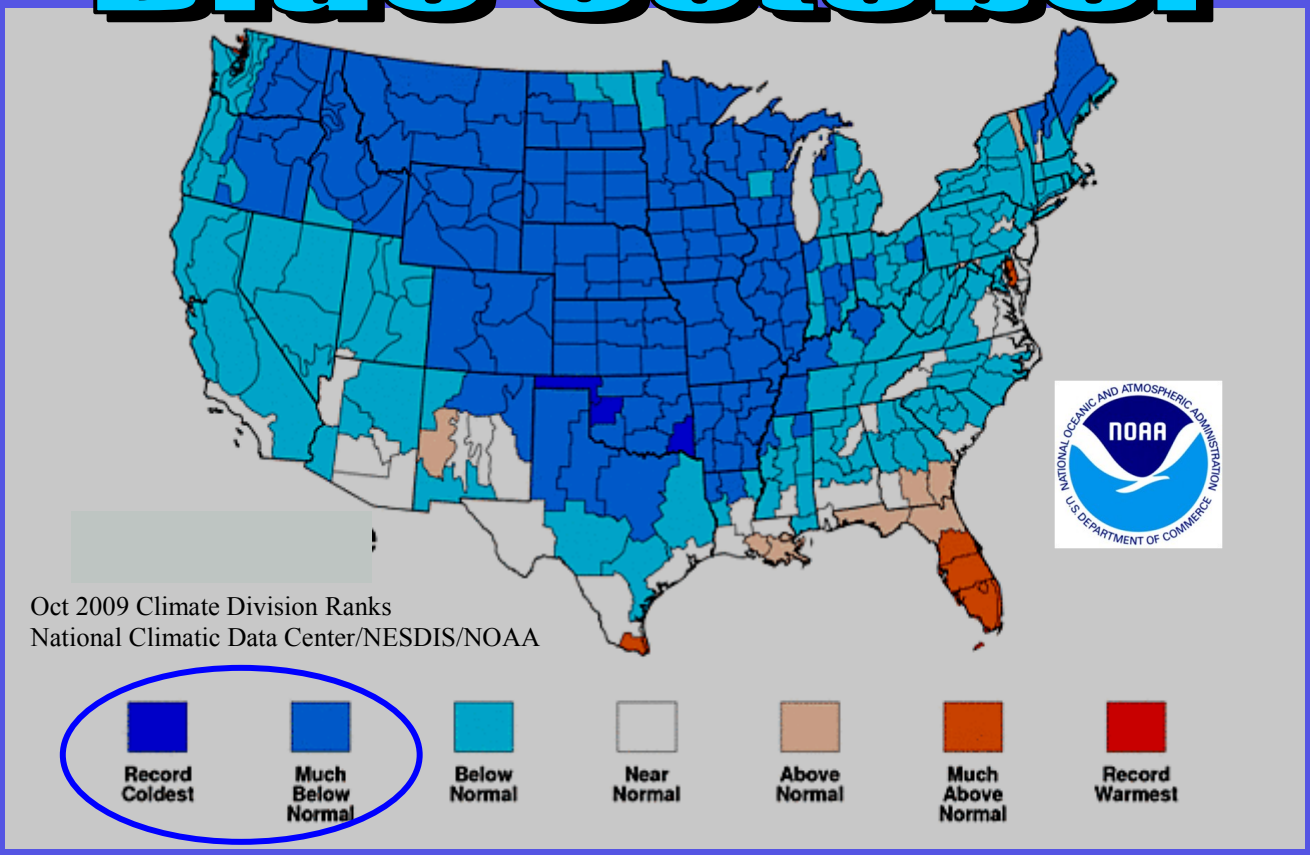
The Southern Plains Cyclone

Autumn 2009

A newsletter from your Norman Forecast Office for the residents of western and central Oklahoma and western north Texas

Blue October



Feature Articles

Wet and Cold Fall

1" Hail Criteria

What is Wind Chill ?

Activity Planner

Space Weather Prediction Center

Meet Your Weather Woman → Jenifer Bowen

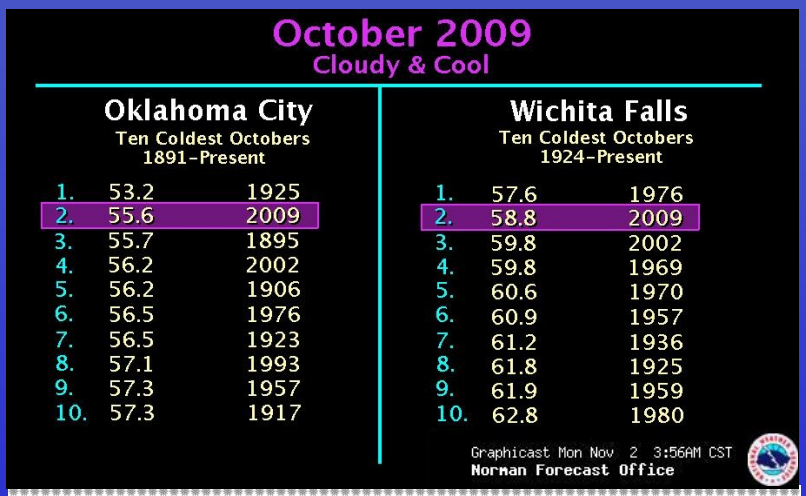
We Make the Difference...When it Matters Most!

Cold & Rainy October Sets Records

By Patrick Burke
General Forecaster

Autumn of 2009, was relatively uneventful at the Forecast Office. Knowing how things can go around here, that's not necessarily a bad thing. We had no significant tornadoes, no ice storms, no large wildfires or severe drought, and relatively little flooding. The month of October, however, quietly made a place for itself in the record books. In doing nothing extraordinary, October became exceptional. October 2009, ranked among the top three coolest Octobers ever measured from the local to the national level, and was *the coldest* ever for the state of Oklahoma.

Watching the day to day movement of a monthly average temperature is not the most exciting proposition. By mid to late month there are enough data points that any single day is not weighted very heavily. On a remarkably warm or cool day the monthly average might change by an exciting two or three tenths of one degree. Monitoring this trend might be an especially dull activity in October, which is unlikely to see extreme heat or extreme cold. And this year's October was even more middle-of-the-road than usual. The warmest temperatures occurred on the first day of the month when Wichita Falls reached 90 degrees and Oklahoma City 82. A Pacific cold front arrived that same afternoon, ushering in mild weather for the next six days to come.



This graphicast, tracking the October monthly average temperature, was updated and placed on the NWS Norman web site during the last two weeks of October.

See **October** on page 2

Meet Your Weather Woman: Jenifer Bowen

Hello! My name is Jenifer Bowen and I am currently a SCEP (Student Career Exploration Program) employee at the National Weather Service Forecast Office in Norman, Oklahoma. A SCEP employee is considered a "Student Intern" who is in training to become a Meteorologist Intern. And I eventually hope to become a General Forecaster in the NWS. My duties in the office are similar to the Meteorologist Interns, and they include the following: verifying warnings

See **Jenifer** on page 5

Severe Hail Size Changed to 1"

By Rick Smith
Warning Coordination Meteorologist

One inch hail

On January 5, 2010, the National Weather Service will change the criteria we use to classify a storm as being severe based on hail size. The old minimum of three quarters (¾) of an inch is being replaced with a new minimum size of one inch (1") in diameter.

Why is the hail criteria changing?

We want our severe thunderstorm warnings to be as meaningful as possible to help you make decisions to protect your life and, if possible, your property. Around here, those warnings are very common. Just this past year,

See **Hailstones** on page 5

What is Wind Chill?

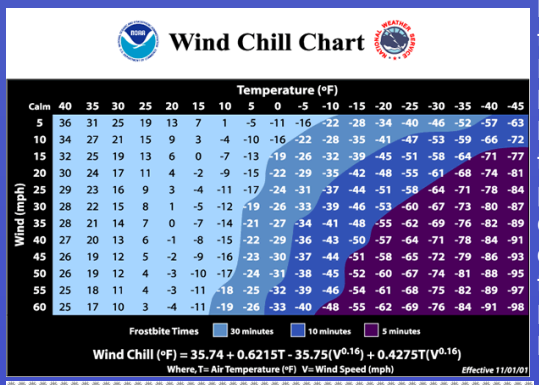
By Alex Lamers

SCEP Employee

Antarctica is known as a place of extreme weather. It holds the record for the coldest surface temperature ever recorded on the planet, a brutal -129°F at Vostok. It is also a very windy place, with gusts as high as 199 mph recorded at Dumont D'Urville near Cape Denison (south of Australia). Australian explorer Douglas Mawson chronicled the hostile environment in a book titled "The Home of the Blizzard," (1915).

Blustery winds concerned those who attempted to explore the vast continent in the early the 20th century. American scientists Paul Siple and Charles Passel conducted experiments during the 1930s, to test the effects of wind and temperature on people. They rigged a plastic bottle at the same level as an anemometer, and measured the cooling rate of its contents depending on the wind speed. The experiments led to the basic conclusion that with stronger wind speeds, heat loss was accelerated. This finding has meaningful implications for people and animals who are caught outdoors during cold winds. As the wind increases over exposed skin, it draws heat from the body, driving down skin temperature and eventually internal body temperature.

Over the remainder of the 20th century, and with ongoing study, scientists began to report the rate of heat loss caused by winds in cold temperatures as the *wind chill temperature*. Because wind chill temperature is related to the rate of heat loss from the body, it can be related to how quickly the onset of frostbite (defined as the point at which skin and tissue becomes damaged by extreme cold) will occur. The most susceptible parts of the body are those farthest from the heart, including fingers, toes, ear lobes, and the tip of the nose. In general, the colder the wind chill temperatures, the faster a person will experience frostbite on exposed skin.



The NOAA/NWS Wind Chill Chart relates wind chill temperature to the number of minutes at which frostbite likely occurs.

The calculation for wind chill temperature is entirely

See **Wind Chill** on page 9

Nation sets Rain Record

Preliminary data from NOAA reveals October 2009, was the wettest October on record. Precipitation across the contiguous United States averaged 4.15 inches. This was 2.04 inches above the 20th century average. Iowa, Arkansas, and Louisiana recorded their wettest October while only Florida, Utah, and Arizona had below normal precipitation. Two major snow storms hit the Upper Midwest and the western Plains states. North Platte, Neb., recorded 30.3 inches of snow, making October 2009 the snowiest month ever for the city.

October...From Page 1

There are only a handful of source regions for the air that frequents Oklahoma and north Texas. Air masses that originate in the Pacific or in the mid-continent to our north are generally cool to cold, depending on the season and prevailing conditions upstream. On the other hand, our frequent periods of southerly winds draw up air that originates over the warm high desert to our southwest or the warm and muggy Gulf of Mexico to our southeast. Little did we suspect that when a Pacific cold front arrived on October 1st, that we would not see a desert and/or Gulf air mass manage to reach the northern and eastern borders of Oklahoma for the rest of the entire month!

That means our weather was dominated by Pacific air and air from the mid-continent to our north. The air was not unusually cold for the time of year - neither Oklahoma City nor Wichita Falls recorded a freeze this October - but it was unusually persistent. And when Gulf air did attempt to return northward, it often mixed with the cool air to form clouds and rain. Oklahoma City finished the month with 5.63 inches of rain which is nearly two inches above average for October. Wichita Falls received 4.23 inches of rain which is 1.21 inches above average. In fact, in Oklahoma it was the 5th wettest October on record, and in Texas it was the 6th wettest.

All of that rain had a profound effect on temperatures, especially during the daytime. The cloud cover and wet ground simply prevented temperatures from warming up. So while overnight lows were not particularly cold, the temperature just didn't rise very much during the day. Numerous days in the middle and later parts of the month saw a range of less than 10 degrees between the overnight low and the afternoon high.

With about a week to go in the month, our climate focal point, meteorologist Bruce Thoren (see the Summer 2003 issue), noticed the daily climate summary was showing large departures from normal. He issued a graphicast listing the ten coldest Octobers at Oklahoma City and Wichita Falls, and 2009, was near the top. Anticipation grew, and the graphic was updated each subsequent day until at midnight November 1st, we had our answer; October 2009, was the second coldest October at both locations. The Oklahoma Climatological

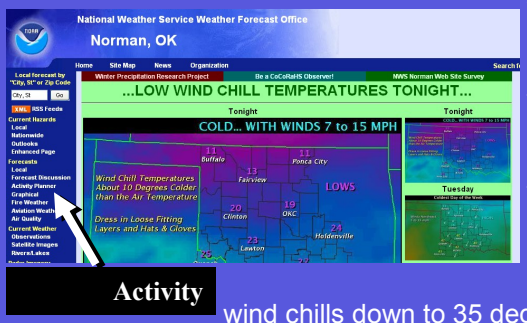
See **October** on page 4

How to Use the Activity Planner!

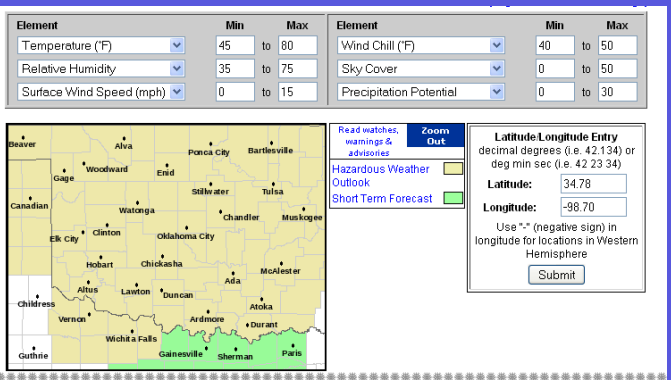
by Patrick Burke
General Forecaster

Oftentimes meteorologists have the information necessary to make an informed decision, but, short of calling and asking one of us, you may not know exactly how to find the information *you* need. That is why we would like to introduce you to the Activity Planner.

You will find it in the same relative position on the front face of either the NWS Norman Main Home Page or the NWS Norman Enhanced Page. The Activity Planner application is marked as the third link beneath the "Forecasts" section on the blue column of links to the left hand side of the page. This is a great tool to use when you have an activity that you would like to undertake during the next seven days, and you would like to know when the weather will best suit your needs. Here is how it works. All of the routine forecast information the NWS Norman produces is tied to a digital database. The database can be searched in a number of ways to produce text-based and graphics-based forecasts. With your desired activity in mind, the Activity Planner asks you to name a range of acceptable values for your choice of up to six weather elements. The Activity Planner then searches the forecast database (which is updated no fewer than once each day and once each night), and displays a timeline showing you when the weather will and when it will not meet your criteria.



Let's take a look at an example. Say that you and your friends are itching to go hiking in the Wichita Mountains near Lawton, OK. You don't want to freeze, but it is December, so you decide you can reasonably accept temperatures above 45 degrees, and you will cross your fingers for 80 degrees (which would be a record high for most December days). You input 45 and 80 as your Min and Max, respectively, in the boxes next to "Temperature (^{0}F)." The element in the next line down has defaulted to "Relative Humidity". While most people don't let relative humidity influence their daily lives, you are weather savvy. You want to minimize the risk of your binoculars starting a fire when you set them down to tie your shoes, so you input 35 percent in the Min box. And you want your hair to look good in the pictures you will take, so you input 75 percent in the Max box. Feeling smart, you pick up the pace a little on your way to the third element down, which is "Surface Wind Speed (mph)". You would like anything from zero wind to 15 miles per hour (again, your hair). Now you scan up to the top of the second column and think, "Surface Wind Direction?" Since you don't really have a preference on this one, you click on the little blue arrow to toggle onto a list of choices. You decide to replace Surface Wind Direction with "Wind Chill (^{0}F)." Here you are thinking that 45 degree air temperature is already a little cold for your taste, but you suppose you could have a good time in wind chills down to 35 degrees. The Max box in this category is somewhat meaningless, but you remember your friend at the National Weather Service telling you that wind chill temperature isn't even calculated for air temperatures above 50 degrees, so you set the maximum at 50. Next is "Sky Cover," and your imagination really starts to run wild. You can just envision a bright, sunny afternoon with light and shadows playing off the bare tree branches, boulders, and wildlife. Oh, you are going to have so much fun! You decide to aim for anything from zero sky cover (meaning zero clouds) to 50 percent sky cover (meaning half the imaginary surface area of your sky could be covered by clouds). And finally, you come to "Precipitation Potential," which you argue should really be called 12-hour Probability of Precipitation. Technicalities aside, you select a Min of zero and Max of 30 percent.

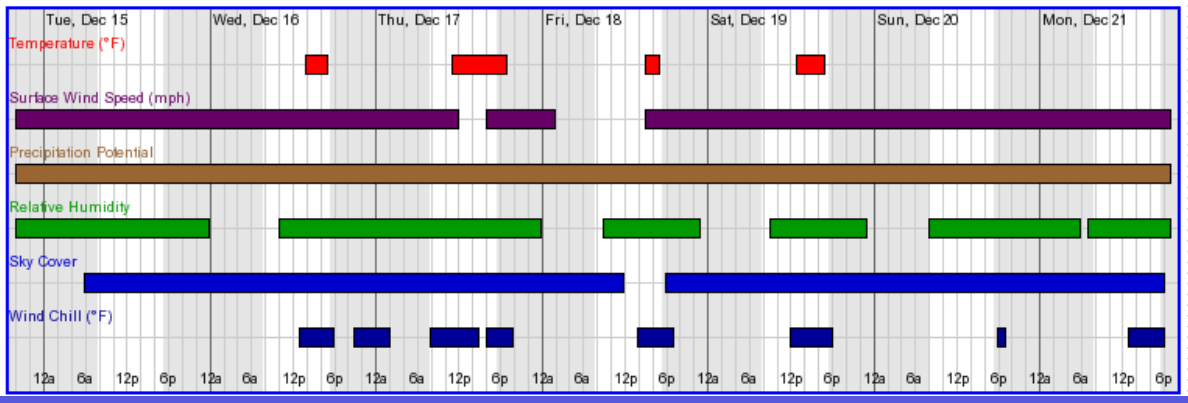


For up to six elements the activity planner allows you to select a range of weather that you find suitable for your activity. It then searches the current 7-day forecast for a time that best fits your needs.

When you have input values for some or all of the weather elements, Activity Planner is ready to go to work. It just needs to know where your activity will be held. You can either click on the city and county map below the elements table, or to get a more precise result you can input latitude and longitude. For your hike, you decide to input the location of Mount Scott in the Wichitas, at 34.78 degrees north latitude and 98.70 degrees west longitude (using a leading minus sign to indicate "west"). Now you are ready to click "Submit!"

See **Planner** on page 4

Planner...from page 3



After taking your input, the Activity Planner returns a timeline for up to six weather elements (e.g., wind chill). Color filled bars indicate periods of time when a respective element meets your criteria. The more bars that are present at the same time on the graph, the more the weather is forecast to meet your requirements. When your activity is not restrained to a particular day, this can be a powerful planning tool.

Through the magic of number crunching, Activity Planner soon presents you with a weather timeline, customized to your specifications. The timeline will display a horizontal bar of varying color for each weather element you selected. The bar is present at times when the forecast weather meets your conditions. Breaks in the bar indicate times at which the forecast weather does not meet your conditions, so if a bar seems to be missing entirely then the weather just isn't doing what you want (it does that to us all the time). The nice thing about displaying information in this way is that you can easily survey seven days of weather forecasts and identify times when most or all of your weather criteria are likely to be met. In our example, the bar for Precipitation Potential is solid all the way through time, meaning the chance of precipitation is not forecast above 30 percent for the next seven days. There are also relatively few breaks in your Sky Cover, Surface Wind Speed, and Relative Humidity criteria.

It looks like Temperature and Wind Chill will play the biggest role in determining when you hike. So you start to scroll the mouse over the timeline along theTemperature bar. Wednesday presents an opportunity, but only for three hours. Knowing your friends' tendencies to be late, you look for a larger window. Thursday offers several hours of warm temperature, but there is a large gap in your Surface Wind Speed bar. Just when you were wondering how bad it could be, you notice there is a numerical readout located beneath the table, and it changes as you scroll along the timeline. The readout tells you that the wind speed is forecast to peak at 21 mph Thursday afternoon. That discourages you, so you keep scrolling all the way to Saturday. Ah, here we go. On Saturday your temperature window offers you 4 hours of mild weather between 1 pm and 5 pm, and all the other bars are filled in during that time as well. This is great! The cursor readout tells you that at 2 pm Saturday it will be 45 degrees with 45 percent relative humidity and a northwest wind at 13 mph.

Thursday, December 17 at 3pm
Temperature: 52 °F Wind Chill: N/A Surface Wind: S 20mph
Relative Humidity: 43% Precipitation Potential: 2% Sky Cover: 45%

Saturday, December 19 at 2pm
Temperature: 45 °F Wind Chill: 39 °F Surface Wind: NW 13mph
Relative Humidity: 45% Precipitation Potential: 10% Sky Cover: 12%

It's a little on the cool side, but with only 12 percent cloud cover at least you can soak up the sun. So you've made your decision; Saturday it is. Your friends will think you're a genius when they get out there and see what a beautiful day it is. We recommend you enjoy their praise for the rest of the afternoon, and then tell them about the tools available from your local National Weather Service.

While the Activity Planner can be a powerful tool, there are a few things to keep in mind. Weather forecasts can change significantly over the course of a few days, so be sure to double check the expected conditions before you head outdoors. Also carry a portable weather radio when you go, in case any hazardous weather pops up suddenly. And finally, the Activity Planner is not intended to replace a spot forecast request for the purpose of burning. The surface winds shown do not account for fuel type, sheltering or slope aspect. If you need precise wind information for a burn, go to the Fire Weather link which is two down from the Activity Planner on the NWS Norman front page, and submit a request for a "Spot Forecast."

October...from page 2

Survey also reported the second coldest October according to data from the Oklahoma Mesonet. The statewide average temperature according to the Mesonet was 54.5 degrees, a tenth of a degree off the old record of 54.4 degrees set in 1925.

The story doesn't end there. The official climate network of the National Oceanic and Atmospheric Administration (NOAA) and the United States includes National Weather Service Cooperative stations. When NOAA included temperatures measured by Cooperative observers, the statewide average temperature became 54.3 degrees. Our dedicated NWS Norman observers played a vital role in determining that October 2009, was the coldest October on record (with records dating back to 1895). Moreover, as seen on the front cover, data from around the nation revealed October 2009, to be the third coldest on record nationally. Here's hoping that we don't repeat that feat in January!

Hailstones...from page 1

our office issued over 750 severe thunderstorm warnings.

For years, many emergency managers and members of the media have asked for the criteria to be raised in hopes of reducing the complacency that can develop when warnings are issued so frequently for a relatively small threat. Parts of the National Weather Service have been testing the new criteria for a few years and the feedback has been very positive. Based on the successful test, the change is being made nationally beginning on January 5, 2010.

Why one inch?

Tim Marshall, an engineer and meteorologist led a large study that tested many different types of roofing materials to see what size hailstones it took to cause damage. His study found that while there is variation depending on the type of material, its age and condition, etc, the potential for roof damage begins with hail that is at least one inch in diameter. The study also showed that moving the criteria to one inch is probably still conservative, since the majority of the damage in their study was associated with even larger hailstones.

Where did the old criteria of ¾ inch come from?

That hail size was used because of a scientific study done back in 1952. The research focused on the impacts of hail on aircraft in flight, and found that hail ¾ inch in diameter was the smallest size that would cause significant damage to an airplane traveling 200-300 mph. Since the severe thunderstorm warnings we know today were based on warnings issued by the military, the criteria they used became the official NWS criteria (this is also true for the wind speed criteria of 58 mph or 50 knots).

Does this mean we'll see fewer warnings?

A quick look at statistics for the state of Oklahoma for the past couple of years shows that nearly half of the hail reported to us was smaller than one inch in diameter. But this doesn't necessarily mean that you'll see half as many warnings with the new criteria.

There should be some reduction in the number of warnings, but we can't say for sure how much of a reduction you'll really see. The tools that forecasters use to help them decide if a warning is needed are getting much better. But it is still a challenge to determine precisely if a storm will produce penny, nickel or quarter size hail. And many of our severe storms have both hail and damaging winds, and they will still require warnings.

That's why we need to know when you see hail in your area. We can compare your hail report to what the radar thinks is happening, and hopefully use that information to issue better warnings.

So you're just going to ignore those storms with hail smaller than a quarter?

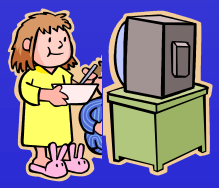
Absolutely not! Forecasters at NWS Norman have a goal – to tell you what we know, when we know it, in as many different ways as we can. Warnings are a very important way to share information, but there are other ways we can tell you about storms that aren't quite severe.

You'll hear about those storms with hail smaller than a quarter in a Significant Weather Advisory, issued for storms that don't appear to be severe, but that still deserve your attention. We can also use our Graphicasts to share information about the not-quite severe storms in your area. The bottom line is you can still expect a steady flow of information about important storms in your area.

Jenifer...from page 1

issued in our office by working with emergency managers and trained storm spotters; performing daily balloon launches to obtain a vertical profile of the atmosphere; inspecting data quality and composing various products for our climate program; most importantly, working alongside NWS Norman meteorologists to discover the skills necessary to become an NWS forecaster.

Growing up in Tulsa, Oklahoma, I saw my fair share of severe weather. From snowstorms to tornadic storms, I was constantly surrounded and fascinated by what the atmosphere was doing. My parents would say that I have literally been interested in the weather since I was two years old. My mother tells the story of how I would get unusually excited about spring severe weather season. My face was always glued to either the window or the television screen - where Meteorologist Jim Giles gave our family the latest warnings and reports. The earliest that I, personally, recall becoming interested in weather was at five years old. Although it probably wasn't safe, my dad and I recorded on video the most significant number of cloud-to-ground lightning strikes that I had ever seen at one time. I can remember the pure awe I felt during that event, and I have kept the tape to this day. I believe that my dad, who encouraged my interest and took me on numerous storm chases, helped motivate me to pursue my dream of becoming a Meteorologist.



The May 3, 1999, tornado outbreak further focused the direction my eventual career would take. At the time, I was 10 years old and can remember clearly the events that occurred on that day. I knew there was a moderate risk of severe weather in Oklahoma and I kept my eyes to the weather throughout the day. In the afternoon I had soccer practice, but my coach dismissed us early when she received word of the F5 tornado that was striking Moore and Oklahoma City. I raced home to watch the tornadic storms unfold through the evening as they gradually moved up Interstate 44 and the Turner Turnpike into the Tulsa area. As a storm that

See **Jenifer** on page 9

Norman Office Forecast Notebook - A Complete Look at Events and Happenings

Winter Test

The Norman Forecast Office is part of an experiment that we hope will make it easier to read our text products. Starting in early December, NWS Norman joined dozens of other offices to test a new bullet format for our Winter Weather (WSW) and Non-Precipitation (NPW) text products. The new format was developed in the Western Region of the NWS, and is designed to make it easier to quickly see the most important information concerning hazardous winter weather and non-precipitation events. The experiment continues through May, and when it's done, the NWS will decide whether the new format should be implemented nationwide.

The test affects the following text products:

Watches

Winter Storm, Blizzard, Wind Chill, High Wind, Excessive Heat, Freeze

Warnings

Winter Storm, Blizzard, Ice Storm, Wind Chill, Dust Storm, Excessive Heat, Freeze, High Wind

Advisories

Winter Weather, Freezing Rain, Wind Chill, Wind, Dense Fog, Dense Smoke, Freezing Fog, Heat, Frost, Blowing Dust

We'd love to know what you think of the new format. Take the survey at:

http://www.weather.gov/survey/nws-survey.php?code=wswnpw

Spotter Training

As the cold north winds blow, it seems like springtime is a long way away. But this is the time of year when storm spotter groups across the area begin to get ready for the peak severe weather season. National Weather Service meteorologists will be helping local emergency managers train storm spotters through the end of March. In an average year, more than 2500 people attend these training sessions. The classes are free and usually open to anyone who is interested. You can get more detailed information about storm spotting and find a class near you at our website:

http://www.srh.noaa.gov/oun/?n=skywarn

Editor's Note

The Christmas Eve Blizzard occurred after most of this Newsletter was complete. You can bet the storm that dumped record snowfall amidst 60 mph winds and whiteout conditions will be featured prominently in our Winter 2010 issue. In the meantime, a storm summary is available on our web site at:

http://www.srh.noaa.gov/oun/?n=events-20091224

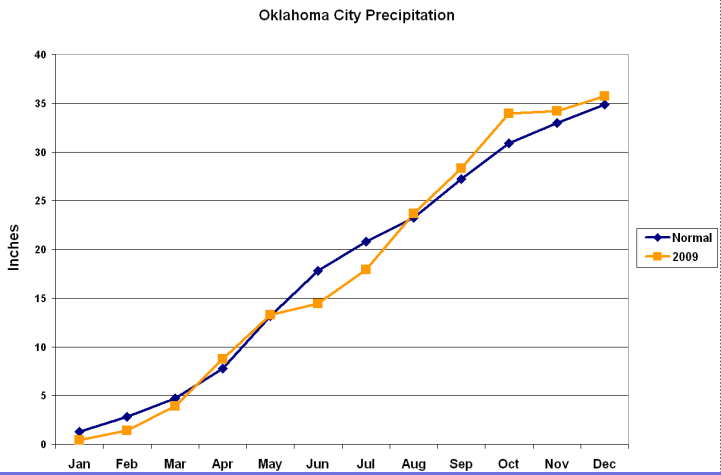
Severe Weather Workshop

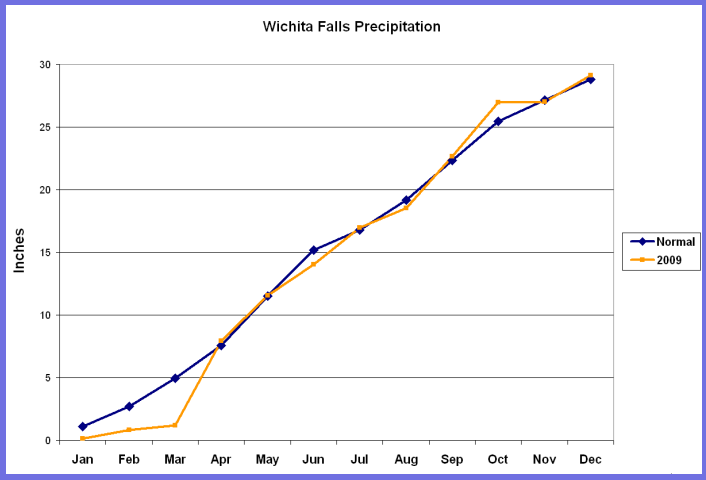
2010 marks the 10th anniversary of the National Severe Weather Workshop! The annual event brings together meteorologists, emergency managers and the media to share ideas and discuss ways to help people be better prepared for, and informed about, dangerous weather.

The 2010 Workshop is set for March 4-6 at the Embassy Suites Hotel in Norman. The agenda is shaping up to be one of the best yet! You can get more details at the official website:

http://www.norman.noaa.gov/nsww

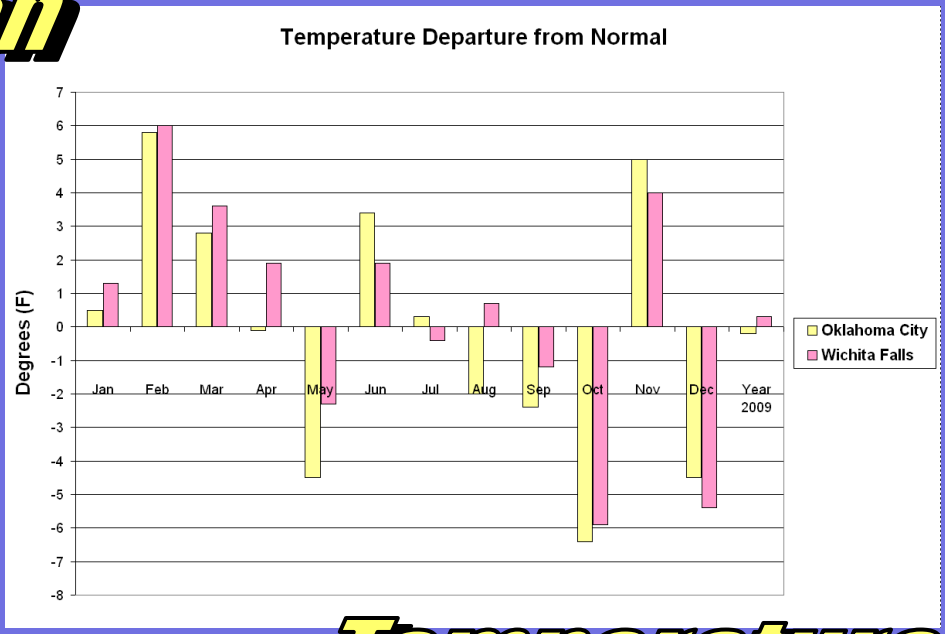
By the Numbers





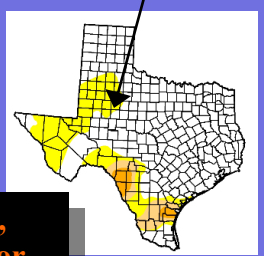
Precipitation

Late winter 2009, was a little dry at Wichita Falls, and the early summer was somewhat dry at Oklahoma City, but, overall, precipitation stayed close to the long term average throughout the year. Some of the heavier rains came during the Fall when Oklahoma City broke two daily rainfall records, both in October. Will Rogers World Airport received 2.39 inches on the 8th, and 1.67 inches on the 29th. October rainfall was 1.99 inches above average there, and 1.21 inches above average at Sheppard Air Force Base in Wichita Falls. The state of Oklahoma recorded its 5th wettest October on record, and Texas recorded its 6th wettest.



Temperature

2009, was certainly a year of ups and downs in temperature. Only January, April, and July through September fell within 1 to 2 degrees of the long term average. Otherwise, there were large swings. Late winter and early spring came in well above average. Then May fell well below average, and the last three months of the year looked like a yo-yo, bouncing from record cold in October to much warmer than average weather in November and back to very cold weather in December. The peaks and valleys balanced out, though, and the yearly temperature wound up only 0.2 degrees below average at Oklahoma City and 0.3 degrees above average at Wichita Falls. Both cities tied a few records for coldest daily maximum temperature during October, and Oklahoma City tied a record low at 41 degrees on October 2nd. According to the Oklahoma Climate Survey, and data from NOAA, the August to October statewide average temperature was the coldest on record for Oklahoma, Kansas, and Nebraska.



December 2009, Drought Monitor

NWS Teamwork:
Space Weather Prediction Center

Adapted from information available online from the Space Weather Prediction Center

Among the nine centers that comprise the National Centers for Environmental Prediction, perhaps the one you least expect to find is the Space Weather Prediction Center. Weather in space? Yes, it's true. Formerly called the Space Environment Center, the Space Weather Prediction Center (SWPC) is a part of the National Oceanic Atmospheric Administration (NOAA) and the National Weather Service, and is jointly operated by the United States Air Force. The SWPC is located in Boulder, Colorado, and is the official source of space weather forecasts, alerts, and warnings for the United States. In fact, that sounds a lot like a weather forecast office, right?

The hazards and conditions that the SWPC monitors and predicts, though, are a little more exotic than rain, hail, and snow. Changes in the solar wind, and well defined events like solar flares and coronal mass ejections (during which part of the Sun's mass can leave the Sun in the direction of Earth) can cause an upheaval of the "weather" in the space surrounding the Earth. In this instance, "weather" refers to changes in the Sun's output of various forms of mass and radiation, from electrons to X-rays. The SWPC is the national and world warning center for disturbances that can affect people and equipment working in the space environment. A few of the agencies and industries that rely on SWPC services include the U.S. power grid infrastructure, commercial airlines, human space flight, satellite launch operations, and U.S. Air Force operations. Using data from U.S. based sensors and collaborating with international partners, the SWPC continually monitors and forecasts Earth's space environment.

Space weather products and warnings originate from a group at the SWPC appropriately named the Space Weather Forecast Office. There are four types of space weather alert messages: Watch; Warning; Alert; Summary. Watches and most of the Warnings are related to geomagnetic activity, or how the Sun's output interacts with Earth's magnetic field. Our magnetic field acts to shield the Earth from harmful, high energy radiation. Intense solar activity can temporarily disrupt the Earth's magnetic field enough to allow some high energy radiation to enter the upper atmosphere. People on the ground are still safe, and may enjoy aurora occurring farther south than is usual. But the radiation does pose a serious threat to astronauts working in space, and a limited threat to aircraft flying at very high altitude. Geomagnetic "storms," can also have adverse effects on satellites, navigation systems, and communications and power systems here on Earth. In 1989, a geomagnetic storm severely affected the Hydro-Quebec power grid, leaving six million Canadians without power. The storm also sparked vivid auroras as far south as Texas.

During intense solar activity the aurora, or northern lights, can be seen as far south as Oklahoma and Texas. On October 29, 2003, sky enthusiast Dave Ewoldt took this photograph near Okarche, Oklahoma. Although photography like this can bring out greater detail than what the unaided eye will see, the aurora can seem very vibrant as it dances across the sky.

Warnings from the SWPC represent high confidence predictions of an event during a specified time period, whereas alerts indicate that real-time measurements have shown a particular event did, indeed, occur or is occurring. This nomenclature is akin to the National Weather Service's use of warnings and local storm reports, in which the warning predicts that a severe weather event will occur, and the a local storm report provides information on an event that has occurred, as measured by instruments or estimated by observers. SWPC summary messages are issued after an event ends, and contain any additional information available at the time of issuance. Space weather alerts and warnings are issued for increased fluxes of X-rays, radio waves, electrons, protons, and for disturbances in the Earth's magnetic field.

Although you probably don't work in space, and have little need to be warned of high altitude X-rays, you may want to be alerted when the Earth's magnetic field is severely disturbed. This is what sometimes brings displays of aurora to our latitude. I witnessed a vivid display in September 2005, over Kansas, and storm spotter and sky enthusiast, Dave Ewoldt, took this long time exposure image near Okarche, OK, in November 2003 (A long time exposure reveals more light than your eye would detect at any given moment). For more information on auroras and other space weather, check out the SWPC web site listed below.

For More Information... http://www.swpc.noaa.gov/

Jenifer...from page 5

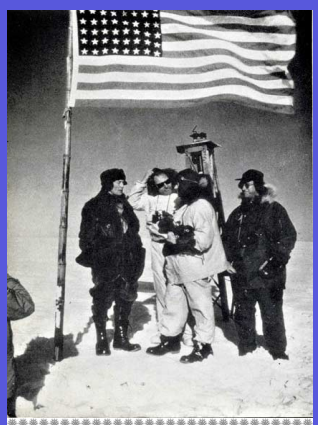
had a history of producing tornadoes approached, my dad and I drove to the top of a hill near Sapulpa (at a safe distance) to watch the storm come through. We saw multiple wall clouds and a possible funnel cloud. I learned that day how dangerous the weather can be. I then wanted to learn as possible much about its behavior so that I could warn the public and help save lives.

I graduated Union High School in Tulsa in 2006, and attended Tulsa Community College for my freshman year. From there, I transferred to the University of Oklahoma in Norman where I am currently a Senior, pursuing a Bachelor's degree in Meteorology with a minor in Mathematics. My hobbies include being a huge OU football fan, singing in the local choir, and traveling. My connection with NWS Norman began when General Forecaster, Patrick Burke, visited one of my entry level Meteorology classes. Patrick promoted the idea of students interested in operational meteorology volunteering their time at the Norman Office to gain experience. Hearing this gave me the initiative and courage to approach the Office and introduce myself. I will never forget the day that I did. After expressing my interest at the front desk, and not knowing whether any positions were available, I was about to leave the office. Just then a man approached me and inquired about my interest in volunteering. We spoke for some time, and only later did I discover that I had spoken with the Meteorologist-In-Charge, Mike Foster. I was interviewed and offered a student volunteer position on the spot!

I began volunteering in June 2008, and was promoted to my current position (SCEP) in August 2008. I love my position here, and I am truly grateful and privileged to be working with some of the best people in the field of Meteorology and the NWS. They have taught me many of the skills that it takes to become a good scientist and forecaster, and I look forward to passing on their knowledge as I continue to pursue my dream.

Wind Chill...from page 2

dependent on air temperature and wind speed. The latest formula was implemented in 2001 by the National Weather Service. It was determined by using a model of skin temperature under various combinations of temperature and wind conditions. Relative humidity was not factored in, as it was determined to have an impact of less than one degree Fahrenheit at most.



Paul Siple (2nd from left) and others developed the concept of wind chill temperature while exploring Antarctica in the 1930s. Photo courtesy Bill Spindler and www.southpolestation.com.

To combat the dangers of wind chill, the National Weather Service issues Wind Chill Advisories and Wind Chill Warnings. The criteria for each are set locally at each National Weather Service forecast office. The National Weather Service in Norman issues a Wind Chill Advisory when the wind chill is expected to range from -5°F to -19°F, and issues a Wind Chill Warning when the wind chill is expected to dip below -20° F.

When a warning or advisory is issued, you should spend as much time as possible indoors to stay warm and dry. If you must venture outdoors, dress appropriately, and limit the amount of time you spend exposed to the wind. Wear several layers of loose-fitting, lightweight, warm clothing. Trapped air between the layers will insulate you. Outer garments should be tightly woven, water repellent, and be hooded or include a hat. Cover your mouth to protect your lungs from extreme cold. Mittens, snug at the wrist, are better than gloves.

2009 Severe Weather Stats

As scientists, we love to look at statistics. Here are some interesting stats and facts for 2009. NWS Norman issued:

764 Severe Thunderstorm Warnings

(about 4% of the national total of 20,752). Practically every square mile of our county warning area was covered by at least one severe thunderstorm warning during the year. Of all the severe weather reports we received, a warning was in effect for 85% of those events.

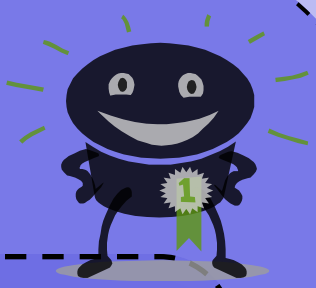
41 Tornado Warnings

The majority of the tornado warnings were issued on four days: February 10; April 26; April 29; May 13. The average lead time for tornadoes (the time from when the warning was issued until the tornado occurred) was 17 minutes.

2009, NWS Norman Warning Verification Stats Exceeded the National Average in Every Category !

COOP Observer Notes

Length of Service Awards

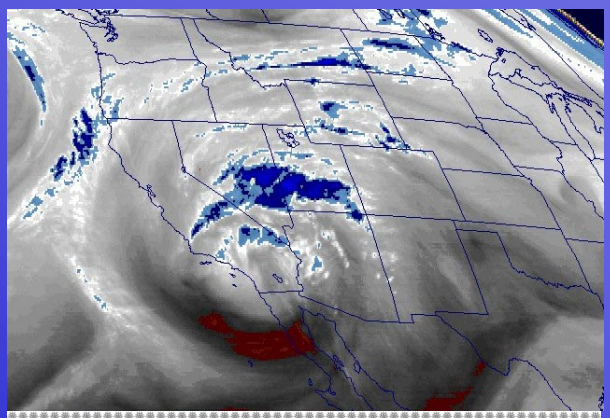


Ray Germany	Coleman, OK	35 Years
Harold and Donna Ebers	Hennessey 4 ESE, OK	20 Years
Glenn Harris	Duncan Airport, OK	15 Years
John A. Carpenter	Holdenville 2 ESE, OK	10 Years

Weather Words

Upper Level Low

Meteorologists use the term "upper level low" to describe the portion of a cyclone (or storm system) that exists high above the ground (usually between 15,000 ft and 20,000 ft). An upper level low is a broad circular region (ranging from 100 up to nearly 1000 miles in diameter) in which winds move cyclonically (moving counterclockwise in the northern hemisphere) and converge around a circulation center. In the region surrounding the upper level low, its center represents the lowest pressure that is occurring at some height above the ground, or, alternately, the lowest height above the ground at which a particular pressure can be found (hence our use of "low" in upper level low).



This satellite image shows data that is tuned not to follow what is visible to the naked eye, but rather subtle variations in atmospheric water vapor (water in its gas state). Water vapor imagery often clearly reveals upper level lows such as the one shown here centered over southern California. The weather around an upper level low is often unsettled, and the bright blue patches from California to southern Utah indicate the tops of cold clouds producing precipitation. Image courtesy The Regional and Mesoscale Meteorology (RAMM) Advanced Meteorological Satellite Demonstration and Interpretation System (RAMSDIS).

Upper level lows can be identified by analyzing the wind, height, and pressure data from the time coordinated flights of several weather balloons across a region, or by inspecting images from weather satellites. Some satellite instruments are tuned to detect variations in water vapor, an excellent tracer for atmospheric flows. Animations of water vapor imagery can reveal unmistakable circulations associated with upper level lows.

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Thanks for Reading!

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Please share this with friends, relatives, and colleagues. Comments and suggestions are always appreciated: by phone at 405-325-3816 or by e-mail at Patrick.Burke@noaa.gov.